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(58) Field of search

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(54) Vending machine refrigeration system

(57) A vending machine has a chamber therein divided by a divider 17 into a product dispensing section and an air passageway section 16. The refrigeration system includes an integral housing so that the refrigeration unit as a whole can be quickly installed or removed. One portion the refrigeration system which includes a compressor 29 and condenser 31 is disposed in but isolated from the lower portion of a product dispensing section and includes an inlet 54, 55 for ambient air, an outlet 56 for ambient air, and a circulation system including a fan 32 for causing air to pass from the inlet to the outlet thereof. An evaporator portion of the refrigeration system is disposed in the air passageway 16 and to one side of the divider 17, an air inlet 40 in the bottom of the divider 17 allowing air from the product dispensing section to pass through the evaporator 34. An air outlet 59 in the top of the divider 17 allows air, which is forced by fans 37 in the air passageway 16 to exhaust cool air into the top of the product dispensing section of the vending machine, thereby causing good circulation of the air through the product dispensing section.

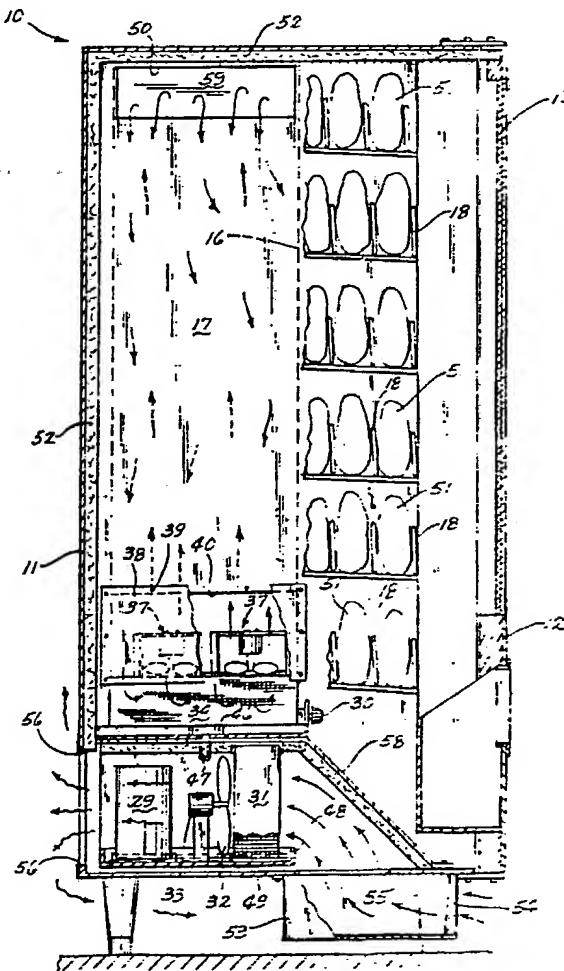


Fig. 4

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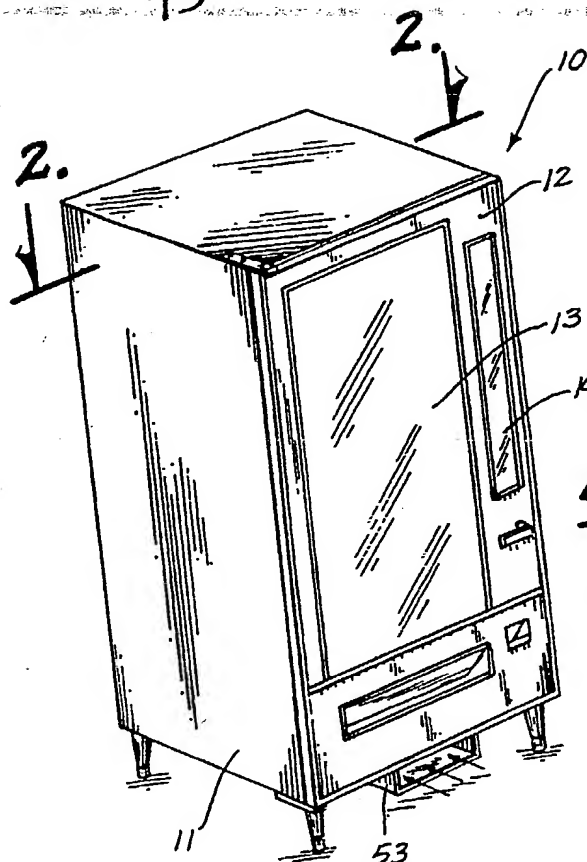


Fig. 1

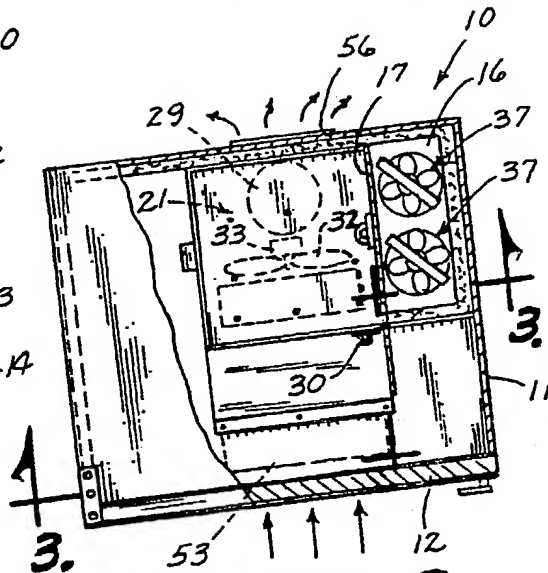


Fig. 2

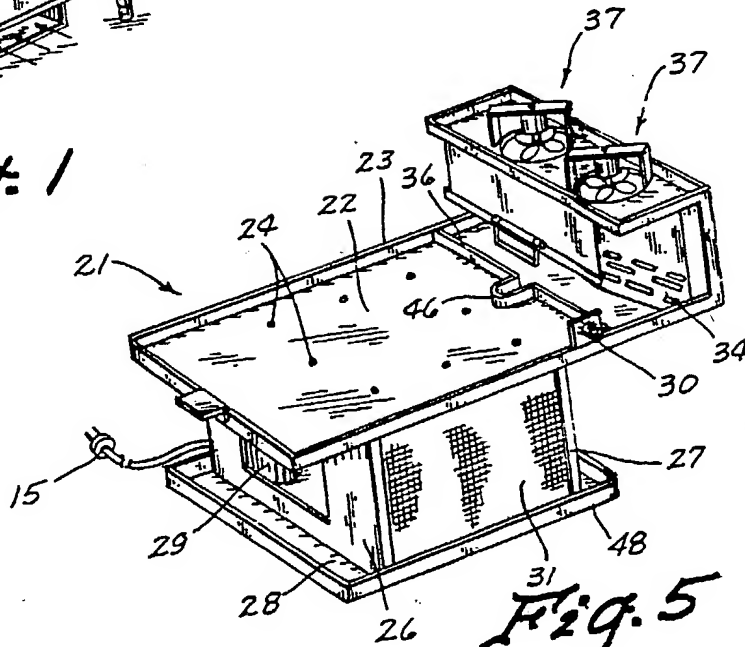
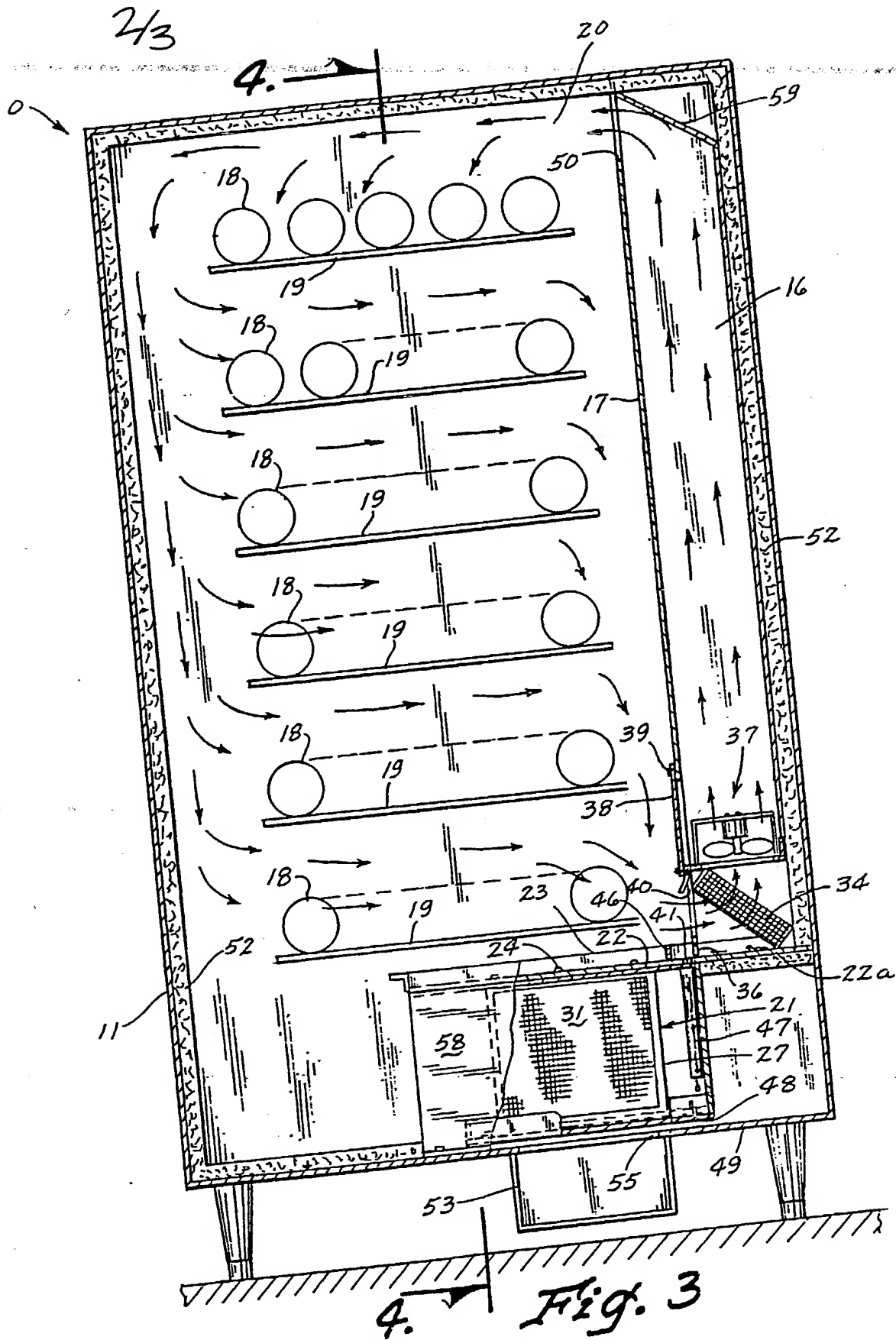


Fig. 5



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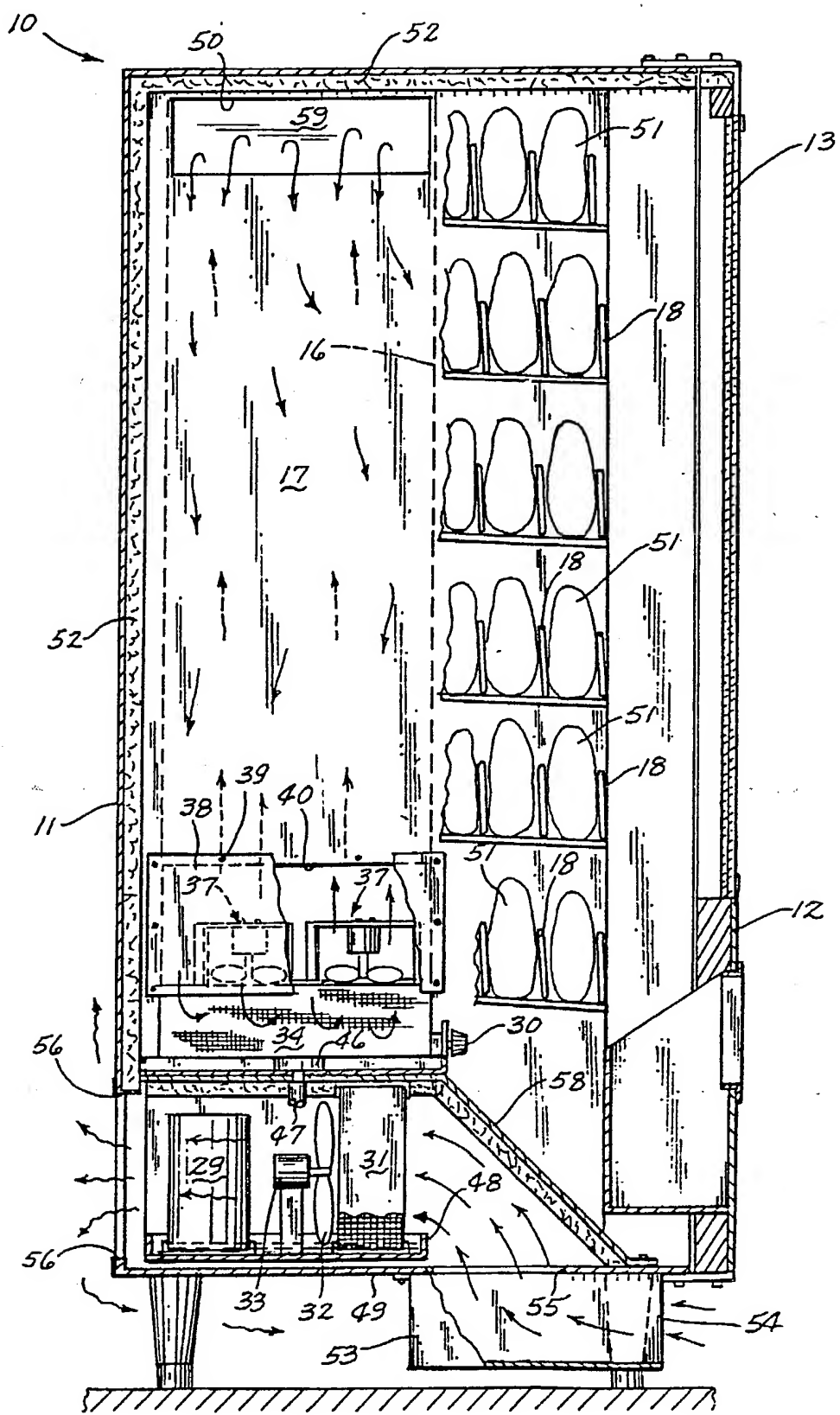


Fig. 4

"Vending Machine Refrigeration System"

The present invention relates generally to a refrigeration system for vending machines and more particularly to a unit which can easily be installed or removed as a portable unit.

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Generally, prior art refrigeration units for vending machines have a forced air evaporator unit disposed on top of a compressor and a forced air condenser unit. One major problem with such an arrangement is that the evaporator unit takes up
10 valuable and otherwise usable space in the product dispensing area of the inside of the vending machine. Also, the prior art systems tend to merely blow cold air against the wall and rely on this circulation
15 system to cool the contents of the vending machine. Not only is this system not conducive to good circulation of cold air within the product dispensing area, but it also causes a build up of static pressure which makes the unit inefficient.

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Also, prior art systems have an inlet for the condenser unit which is too close to the outlet of exhaust air for the condenser unit whereby the inlet air is hotter and wetter than it needs to be, thereby also causing inefficiencies.

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The present invention relates to a refrigeration system for a vending machine. The vending machine has a chamber therein divided into a product dispensing

section and an air passageway with a divider disposed therebetween. The refrigeration system includes an integral housing so that the refrigeration unit as a whole can be quickly installed or removed. The
5 refrigeration unit portion, which includes a compressor and condenser, is disposed in the lower portion of a product dispensing section and includes an inlet for ambient air, an outlet for ambient air, and a circulation system for causing air to pass from the
10 inlet to the outlet thereof. An evaporator is disposed in the air passageway and to one side of the divider thereby creating more usable area in the product dispensing section of the vending machine. An air inlet in the bottom of the divider allows air from the
15 product dispensing section to pass through the evaporator and an air outlet in the top of the divider allows air, which is forced by a fan in the air passageway, to exhaust into the top of the product dispensing section of the vending machine, thereby
20 causing good circulation of the cooled air through the product dispensing section.

An object of the present invention is to provide a vending machine refrigeration system which does not interfere with efficient utilization of the product
25 dispensing portion thereof.

Another object of the present invention is to improve circulation of air within the product dispensing section of a vending machine.

A further object of the present invention is to
30 prevent a build up of static pressure within the product dispensing section of a vending machine and thereby eliminate one cause of inefficiencies in vending machines.

A still further object of the invention is to
35 provide a refrigeration system of the aforementioned type which can easily be installed or removed as a unit.

A still further object of the invention is to provide a vending machine refrigeration unit of the aforementioned type which does not co-mingle exhaust air from the condenser with the inlet air to the
5 condenser, thereby increasing the efficiency thereof.

Other objects, advantages and novel features of the present invention will become apparent from the following detailed description of the invention when considered in conjunction with the accompanying
10 drawings.

Fig. 1 is a perspective view of a vending machine constructed in accordance with the present invention;

15 Fig. 2 is a partial cross-sectional view taken along line 2-2 of Fig. 1;

Fig. 3 is an enlarged cross-sectional view taken along line 3-3 of Fig. 2;

20 Fig. 4 is a cross-sectional view taken along line 4-4 of Fig. 3; and

Fig. 5 is a perspective view of a preferred embodiment of the refrigeration unit of the present invention.

25 Referring now to the drawings wherein like reference numerals designate identical or corresponding parts throughout the several views, Fig. 1 shows a vending machine (10) constructed in accordance with the present invention and having a cabinet (11) with a
30 front access door (12) pivotally attached thereto. A glass front (13) allows the user to view the products therein and a control panel (14) allows the user to choose the product desired.

It will be understood to those skilled in this
35 art that various mechanisms extend behind the control panel (14) and extend into an air passageway (16) to one side of a divider (17) as is clearly shown in Fig.

3. Helixes (18) are disposed on shelves (19) in the product dispensing section (20) of the vending machine (10). Product (51), as shown in Fig. 4, is disposed between convolutions of the helixes (18) and the operation of the vending machine can be like that shown in U.S. Patent No. 3,883,039 to Wittern, et al. It will also be understood, of course, that this invention is not limited to a helical type vending machine and that other types of product dispensing devices can be used without departing from the spirit and scope of the invention disclosed herein.

Referring to Fig. 5, a portable refrigeration system (21) includes a housing section (22) with an upper flange (23) attached thereto and a plurality of fasteners (24) therein. Housing sections (26) and (27) and floor (28) hold a sealed compressor unit (29) and a condenser (31). A fan (32) operated by an electric motor (33), pulls air through the condenser (31) in the direction of the arrows.

A conventional evaporator coil (34) is rigidly attached to the housing section which is generally that shown to the right of the upper drain pan (36) in Fig. 5. This allows the evaporator coil (34) and the forced air fan units (37) to be placed in the air passageway (16) as shown in Figs. 3 and 4.

An access door (38) is removably attached to the divider (17) by fasteners (39) so that the door (38) can be removed to place the unit in the position shown in Figs. 3 and 4. The door (38) is reattached to the operative position shown in Fig. 3.

A drain hole (41) allows water which gathers on the drain pan (36) to flow into section (46) of the pan (36) and then down through a tube (47) onto a tray (48) which can be integrally attached to the bottom of the housing (26) or the tray (48) can merely rest on the top of a bottom wall (49) of the vending machine (10).

It will be understood, of course, that insulation (52) is disposed inside of the cabinet (11) and door (12) to help keep the inside of the vending machine (10) cool in keeping with the purpose of the refrigeration unit (21). An air scoop (53) is attached to the bottom wall (49) of the vending machine to cause an opening (54) at the front of the vending machine which leads to an opening (55) in the bottom wall (49) of the vending machine (10). An exhaust opening (56) is at the back of the vending machine cabinet (11) for reasons which will be disclosed below.

In operation, the refrigeration unit (21) would be installed into the vending machine (10) by first opening the door (12) and removing the panel (38) on the divider (17). The refrigeration unit (21) is then dropped into an opening formed around wall (58), shown in Fig. 4, so that the portion thereof having the compressor (29) and condenser (31) thereon does not come into contact with the circulated air within the chamber (20) or air passageway (16). Then the panel (38) is reinstalled so that the evaporator (34) and circulation fans (37) are effectively disposed within the air passageway (16).

The electrical power supply cord (15) for the refrigeration unit (21) can be plugged in and then a control knob (30) can be utilized to turn on the unit and to control the temperature within the vending machine (10) and thereby the operation of the refrigeration unit (21).

When in the cooling mode, the air enters the inlet (54), shown in Fig. 4, because it is drawn therethrough by rotation of the fan (32). Heat is then drawn off of the condenser (31) and heated air exits out the exhaust opening (56) on the back of the vending machine (10). By having the inlet (54) separated from the exhaust (56), the coolest air available is being

utilized to thereby increase the efficiency of the refrigeration unit (21).

At the same time that the condenser (31) is being cooled, the evaporator (34) is absorbing heat
5 from the air drawn from the product dispensing section (20) through inlet (40) by the fan unit (37) to thereby cause the cooled air in the air passageway (16) to then be diverted by air deflector (59) through exhaust
10 opening (50) in the top of the divider (17) so that the air will circulate past the product (51) in the product dispensing section (20) of the inside of the vending machine (10). Any moisture which collects below the
15 evaporator (34) will drain through opening (41) and pipe (47) into the tray (48). The heat from the condenser (31), in combination with the circulation of air by the fan (32), will cause this moisture to
20 evaporate and be exhausted with the air through the exhaust opening (56) in the back of the vending machine (10).

20 Because the air circulation fans (37) do not force the air directly against the wall of the inside of the chamber (20) but instead have a passageway (16) for directing such air, there is no build up of static
25 pressure; instead there is a constant circulation pattern throughout the inside of the vending machine (10).

Accordingly, it will be appreciated that the preferred embodiment disclosed herein does indeed
30 accomplish the aforementioned objects. Obviously, many modifications and variations of the present invention are possible in light of the above teachings. It is therefore to be understood that, within the scope of the appended claims, the invention may be practiced
otherwise than as specifically described.

CLAIMS

1. A vending machine apparatus comprising:
 - cabinet means for forming an enclosed chamber;
 - a substantially vertical divider disposed in said chamber and attached to said cabinet means;
 - 5 a product dispensing section on one side of said divider and an air passageway disposed on the other side of said divider;
 - means for selectively dispensing products disposed in said product dispensing section;
 - 10 an inlet air opening disposed in a bottom portion of said divider for allowing air from said product dispensing section of said chamber to enter said air passageway;
 - an outlet air opening disposed in said divider
 - 15 on a top portion thereof for allowing air to exit the air passageway and enter the product dispensing section;
 - a forced air refrigeration means for cooling said product dispensing section, said refrigeration
 - 20 means including;
 - a housing having a first section and a second section, said first section being disposed in a bottom section of said product dispensing section of said chamber and said second section being disposed in said
 - 25 air passageway;
 - a compressor unit and a condensing unit being attached to the first section of said housing;
 - means for circulating air from outside of said cabinet means, past said condensing unit, and
 - 30 exhausting such air adjacent to the outside of said cabinet means;
 - an evaporator unit attached to said second section of said housing and being disposed in said air passageway; and

means for circulating air through said evaporator unit.

2. The vending machine apparatus of claim 1 including an access door movable attached to said divider for allowing said second portion of said housing and said condensing unit to be alternatively placed in said passageway or removed with the rest of said housing and refrigeration means.

3. The vending machine apparatus of claim 1 wherein said air circulating means for the evaporator unit comprises a fan located in said passageway.

4. The vending machine apparatus of claim 1 wherein said air circulating means for said condensing unit comprises an electric fan.

5. The vending machine apparatus of claim 1 including air inlet means attached to said cabinet means for permitting only air from the front of said cabinet means to enter said condensing unit air circulating means.

6. The vending machine apparatus of claim 5 including an air exhaust means attached to said cabinet means for exhausting air to the rear of said cabinet means whereby exhaust air will not be easily commingled with inlet air.

7. The vending machine apparatus of claim 1 wherein said first and second housing sections are integral whereby the entire refrigeration means is alternatively removable or replaceable as one unit.

8. A vending machine apparatus substantially as herein described with reference to and as shown in the accompanying drawings.